

## CLAIMS

- 1     1.     A method comprising
  - 2                 passing an electrical current through a thermistor to raise its
  - 3                 temperature above the temperature of oil flowing in pulses past the
  - 4                 thermistor,
  - 5                 measuring a change in temperature of the thermistor
  - 6                 occurring with respect to one or more of the pulses,
  - 7                 determining a level of oil flow corresponding to the
  - 8                 measured change in temperature, and
  - 9                 issuing a signal based on the determined flow level.
- 1     2.     The method of claim 1 in which measuring the change in temperature comprises measuring a change in voltage across the thermistor over a period of time.
- 1     3.     The method of claim 2 in which the period of time corresponds to different portions of at least one of the pulses.
- 1     4.     The method of claim 2 in which the period of time begins at the start of one of the pulses and ends no later than the start of the next one of the pulses.
- 1     5.     The method of claim 1 in which the thermistor is housed in a package having an area that yields an oil flow of 10 to 20 inches per second.

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1       6.     The method of claim 5 in which the area is in the range of  
2     0.0005 to 0.002 square inches exposed to the flowing oil.

1       7.     The method of claim 1 in which the oil is flowing in a 2-  
2     cycle marine engine.

1       8.     The method of claim 7 in which a signal indicative of the  
2     timing of the pulses is received from an electronic control module  
3     of the engine.

1       9.     The method of claim 7 in which the signal based on the  
2     determined flow level is sent to an electronic control module of the  
3     engine.

1       10.    The method of claim 1 in which the rate of pulses is as high  
2     as 5Hz.

1       11.    The method of claim 1 in which the rate of pulses is as low  
2     as one pulse per day.

1       12.    Apparatus comprising  
2              a coupling having (a) two open ends adapted for connection  
3              to upstream and downstream tubes of a pulsating oil circulation  
4              system of an engine and (b) a channel configured to direct the oil  
5              to flow past a thermistor connected to a sensing circuit,  
6              the sensing circuit comprising elements connected to  
7              determine a change in a voltage across the thermistor and to  
8              compare the change to a threshold.

- 1       13.     The apparatus of claim 12 in which the sensing circuit  
2     includes a sample-and-hold circuit connected to store a voltage  
3     across the thermistor.
  
- 1       14.     The apparatus of claim 12 in which the sensing circuit  
2     includes a delay circuit connected to provide timing signals for the  
3     period over which the change in voltage is determined.
  
- 1       15.     The apparatus of claim 12 in which the sensing circuit  
2     comprises a microcontroller that includes an analog-to-digital  
3     converter.
  
- 1       16.     The apparatus of claim 12 also including ports connected to  
2     carry timing and flow-state signals between the sensing circuit and  
3     a control circuit of the engine.
  
- 1       17.     A marine engine comprising  
2                  moving parts arranged to be lubricated by oil delivered  
3                  through a supply line from a supply of oil,  
4                  a pump configured to pump oil from the supply to the  
5                  moving parts in pulses controlled by a controller, and  
6                  a sensor connected to receive pulses of the oil and to detect  
7                  the oil flow state of the engine using a temperature sensitive  
8                  electronic element and a circuit that analyzes an electrical  
9                  parameter of the temperature sensitive element at times based on  
10                 the pulses of the oil.
  
- 1       18.     The engine of claim 16 in which the temperature sensitive  
2     electronic element comprises a thermistor.

1       19.     The engine of claim 16 in which the circuit includes an  
2       electrical interface to a controller that controls the timing of the  
3       pulses.

1       20.     A method comprising  
  
2              passing an electrical current through a thermo-electric  
3       sensor to raise its temperature above the temperature of a non-  
4       conductive or high resistance fluid flowing in pulses past the  
5       sensor,  
  
6              measuring a change in temperature of the thermo-electric  
7       sensor occurring with respect to one or more of the pulses,  
  
8              determining a level of fluid flow corresponding to the  
9       measured change in temperature, and  
  
10          issuing a signal based on the determined flow level.

1       21.     The method of claim 20 in which the thermo-electric sensor  
2       comprises a thermistor.

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